

XVI. A BRIEF REPORT UPON THE EXPEDITION OF THE  
CARNEGIE MUSEUM TO CENTRAL<sup>1</sup> SOUTH AMERICA.

BY JOHN D. HASEMAN,<sup>1</sup>

TOGETHER WITH A LIST OF LOCALITIES AT  
WHICH MR. HASEMAN COLLECTED.

BY C. H. EIGENMANN.

I sailed, October 5, 1907, from New York to Bahia to collect fishes for the Carnegie Museum. I arrived in Bahia on the 19th of the same month. I went with the expectation of remaining about a year in southeastern Brazil. In fact I did not return to the Museum until February, 1910, when I had far exceeded the original plans. During my stay in South America I made what may be considered numerous separate journeys, of which I propose to give a brief outline, to be followed by an account of the methods I employed in collecting.

I am very grateful to Dr. W. J. Holland, the Director of the Carnegie Museum, whose untiring assistance and sympathy never waned. I am also very grateful to Dr. Miguel Calmon, the Brazilian Minister of Industries, for his kind assistance. Dr. O. A. Derby, the Director of the Brazilian Geological Survey, deserves a great deal of credit for the success of the expedition, because many things would have been impossible without his kind coöperation. I am also very thankful to Dr. J. C. Branner, Dr. Carlos Moreira, and many other persons in various South American countries, as well as to some of my former professors, especially Professor Eigenmann, who assisted me in various ways. I desire particularly to express my grateful appreciation of the services of all of my native guides, who made it possible for me to penetrate and return from the far interior of Brazil.

ITINERARY.

*Journey No. 1. The Basin of the Rio São Francisco and the Waters to the East and West of it. From November, 1907, to March, 1908.*

After a few days' delay at Bahia, where I collected in the markets

<sup>1</sup> This is the second of the series of papers which are to be published upon the Expedition to Central South America.

and in the bay, I began collecting in the headwaters of the Rio Itapicuru along the eastern base of the Serra da Jacobina. I crossed this range at the village of Jacobina and rode down the arid basin of the Rio Salitre to Baixa Grande, where I explored a large cave. In pools of the Rio Salitre I found two species of cichlid fishes, already known to science, which had not been previously reported from the basin of the Rio São Francisco, and were in fact the first specimens of *Cichlida* recorded from that system of streams. From Baixa Grande I recrossed the Serra da Jacobina and returned to Bom Fim, or Villa Nova da Rainha. After collecting for some days at and near Bon Fim, I went to Joazeira, a small town on the banks of the Rio São Francisco. From Joazeira I went seven hundred and fifty miles up the Rio São Francisco to the point where navigation terminates on account of the rapids of Pirapora. This trip was taken in a small steamer. Dr. Cleto Japi Assu, the Director of the Steamship Company plying on the river, gave me a pass on all of the boats of the line, which was a great favor, because at that time I did not know very much of the language. From Pirapora I returned to Cidade da Barra, where I collected about two weeks in the rivers, smaller streams, swamps, and adjacent lagoons and lakes. I then went up the Rio Grande to Barreiras and back to Boqueirão, which is located at the fork of the Rios Grande and Preto. I went up the Rio Preto to Santa Rita and rode over the Serra de Piauí to Lagoa de Paranagua in the state of Piauí. I returned to Santa Rita and rode along the Rio Preto to its junction with the Rio Sapon. I continued up the Rio Sapon to its headwaters. Here I found the basin of an old drained mountain lake having a good connection with the Rios Sapon and Nova, thus uniting the São Francisco and the Amazon basins. I continued down the Rio Nova to the waterfall known under the name of Cachoeira da Velha, about twenty miles above Porto Franco on the Rio do Sonno. The horrors of the hunger and rain I endured on my retreat upon the back of a worn-out mule as I made my way over the chapada between Jalapão and Prazeres will remain untold. I finally arrived again in Bahia early in March. The chief results of this trip were:

1. The discovery that cichlid fishes occur in the São Francisco basin.
2. The confirmation of the rumor that there is a connection between the Rio Tocantins and the Rio São Francisco.

3. An increase in the number of fishes reported from the São Francisco River.

4. The determination that the fishes of the Itapicurú are nearly all found in the São Francisco River.

*Journey No. 2. Along the Coast North of Bahia. The latter part of March and the first two weeks of April, 1908.*

From Bahia I sailed up the coast to the mouth of the Rio São Francisco, in order to collect fishes below the large Paulo Affonso Falls. I went up to them and found that during heavy floods fishes might pass the Bahian branch of the falls. I returned to the mouth of the river and went up the coast to Pernambuco. However, the long dry season made work in this section of Brazil almost futile. Therefore I returned to Bahia, collecting as I traveled. The most important result of this trip was the discovery that it is possible for fishes to pass the Falls of Paulo Affonso.

*Journey No. 3. To the Waters about Rio de Janeiro and São Paulo. From April 19 to first week of November, 1908.*

I left Bahia for Rio de Janeiro on April 19, and, after six days of necessary delay in Rio, went to the headwaters of the Rios São Francisco, Doce, and Grande of the Parana basin. On the return I collected in the lower courses of the Rio Parahyba, Lagoa Feia, and Rio Itapemirim. The chief result of this trip was the discovery that the *Gymnotidæ* are represented in the coastal streams of eastern Brazil. I returned to the Parahyba and went across the divide to the headwaters of the Rio Grande. Then I proceeded up the Parahyba River and crossed over the divide to the Tieté basin and down the same to São Paulo. From São Paulo I went to various places near Santos. After returning to São Paulo I proceeded to the Parahyba River near Araguary and back to Bebedouro, Piracicaba, and down the Rio Tieté to the upper Rio Parana. I returned to Bauru and went over to Salto Grande de Paranaponema. These trips were undertaken with a view to ascertaining the relation of the distribution of the aquatic life to the various waterfalls in the upper Rio Parana and its affluents. I returned to Rio de Janeiro in November. The chief results of these excursions were:

1. The addition of many species, heretofore known and described, to the faunal list of the region.

2. The knowledge that fishes can pass practically all of the waterfalls during big floods.

## 3. The abundance of molluscs in certain regions.

*Journey No. 4. To the Rio Ribeira da Iguape. November to December 19, 1908.*

From Rio de Janeiro I went down the coast to Iguape. I then ascended the Rio Ribeira da Iguape in boats and canoes as far as Iporanga and walked over some of the outliers of the Serra do Mar to Agua Quente, near which point I explored a cave called Caverna das Areas. In this cave I collected several specimens of a blind catfish, which previously had been taken by Ricardo Krone of Iguape. I also caught six specimens of *Aglea intermedia*, a crab with reduced eyes. The chief results of this trip were:

1. The collection of the two interesting species found in the Caverna das Areas.
2. The securing of a large number of species not previously reported from the Ribeira basin.
3. The observation of the excessive development of mailed catfishes in the Ribeira.
4. The determination of the great similarity of the fishes of the Ribeira to those of the upper Rio Parana.

*Journey No. 5. To the Rio Iguassú. From December 20, 1908, to the middle of January, 1909.*

From Iguape I went to Paranagua and over the Serra do Mar to the Iguassú basin. The chief results of this trip were:

1. The observation of the paucity of fishes and other forms of life in the Rio Iguassú.
2. Nearly all of the fishes are new species.
3. Fishes cannot ascend the large falls of the Iguassú.
4. I infer that the Iguassú basin is far older than any of the aquatic forms which inhabit the Parana basin.

*Journey No. 6. Rio Grande do Sul to Montevideo. From the middle of January to February 17, 1909.*

I sailed down the coast to Porto Alegre and worked my way over to the Uruguay River and thence to Montevideo. The chief results of this trip were:

1. The large number of species of fishes, molluscs, and crustacea, which I obtained from this part of South America.
2. The determination of the absence of any connection which will allow an easy intermingling of the forms of the Rio Grande do Sul with those of the La Plata basin.

*Journeys Nos. 7 and 8. To San Juan and the Rio Colorado. From February 18 to March 15, 1909.*

From Buenos Ayres I made two trips, one to San Juan, and the other to the Rio Colorado. Both of these trips revealed the paucity as well as the similarity of the life of the two regions.

*Journey No. 9. Paraguay basin to São Luiz de Cáceres, and thence to Manaos. From March 15 to November 10, 1909.*

I took a boat from Buenos Ayres for Asuncion, Paraguay, and went to the creeks near Sapucay and to Villa Hays. I went up the Paraguay River to Corumba, near which point I collected in the Urucum Mts., and in eastern Bolivia at Puerto Suarez. I went on up the Paraguay River to São Luiz de Cáceres, whence I started on a trip by ox-cart *via* San Matias, Bolivia, along the trail to San Ignacio as far as Las Encruzaijas, where I turned to the north in order to reach a farm called Bastos, situated on the banks of the Rio Alegre. Then I went down the Guaporé River as far as the fort at Principe da Beira, where there are some dangerous rapids during the dry season. On account of the rapids and reputedly bad Indians I went up the Rio Machupo to San Joaquin, and took an ox-cart over to the Marmore, where I fished some time at a farm called Berlin. I went down the Marmoré River to Guaja Mirim and then to Villa Bella, which is situated at the fork of the Rios Marmoré and Beni. I then went over the various Madeira falls to São Antonio de Rio Madeira, where I boarded a small steamer for Manaos. The chief results of this long trip were:

1. A large collection of aquatic forms from a little known region.
2. The conviction on my part that there is no connection between the Paraguay and Amazon basin through which a wholesale exchange of fishes has taken place.
3. The majority of the species of fishes have been able to pass all of the Madeira falls.
4. Certain swamp-loving species of fishes are found in the headwaters of nearly all of the Brazilian rivers.
5. The belief on my part that no species of *large* fishes have ever passed from the headwaters of any river basin into that of another.

*Journey No. 10. The Lower Amazon basin. From November 10, 1909, to January 25, 1910.*

From Manaos I went to Santerem, where large collections were



made. I went down the Amazon to Belem, Para, and made two excursions from the latter point, one to Bragança, the other to Alcobaca at the first rapid in the Rio Tocantins. These trips added many new forms to the collection, more particularly parasitic catfishes, cœcilians, reptiles, lepidosirens, turtles, and one fine specimen of *Pipa americana* with eggs in its back.

I sailed from Belem, Para, for New York on January 25, 1910.

Much of the time of the entire trip was consumed in traveling. This is especially true for the regions where primitive modes of transportation were often necessary. The task was not an easy one for one person. The necessary physical exertion detracts from the collecting ability of anyone. However, I feel confident that from this trip the Museum now has the largest collection of fishes from the region between the Amazon and Patagonia. I also collected a great many batrachia, molluscs, crustaceans, and aquatic insects found in the region traversed by me. I also collected about thirty species of snakes and several thousands of lepidoptera and coleoptera, with other material of minor importance.

I believe that the most important result of the expedition will probably be the modification in some respects of the theories which have been hitherto advanced in regard to the distribution of South American fishes.

#### IMPLEMENTS AND METHODS OF COLLECTING.

In order to obtain all species thorough explorations must be made in a great variety of localities. Search must be instituted in swamps, in lakes, along the margins of rivers, especially under the plants which usually grow along the sides of all slowly flowing streams, in rapidly flowing waters, in stagnant pools, in whirlpools, in deep water, in clear and in muddy water, in rapids and in waterfalls, under rocks and logs, in sand and mud, in hollow logs, in holes in rocky ledges and the banks of rivers, in holes in dried up lagoons, in mountain rills, in coastal swamps, in shady streams, and in the campos. Each of these proved to be the habitat of some species not found anywhere else, and methods of collecting must be selected which are suitable both to the species and to its environment. The following is an account of the appliances and methods which I employed, or of which I heard.

1. *Seines with Different Sizes of Meshes and a Central Sack.*—A seine about seventy-five feet long (the so-called "Baird Col-

lecting Seine"), having a mesh of one-quarter of an inch, is the most valuable of all implements. With this it is possible to collect along the margins of rivers both in the daytime and at night. This seine is also useful in lagoons and creeks, and on sand-bars, but it cannot be advantageously drawn in muddy places. Shorter seines are needed for small and rapid streams, especially when there are large quantities of brush and boulders in them. I had better success by placing the seine without a canoe when the water was not deep. During the day I always had far better success by placing the nets around large sections of the plant-grown margins of the lakes and rivers and fastening both ends of the net to the banks. Then the encircled plants were quietly removed and the nets pulled ashore. In this way I sometimes obtained a canoe-load of fishes at one haul, the catch containing at times as many as fifty species. Great care must be taken in employing this method because of alligators, snakes, and sting-rays. Seining, as well as other methods of collecting, should be employed during all stages of the rise and fall of the rivers, because there is a wonderful migration of fishes during this time. The Guarani Indians call this migration *Piracema*, and at times they cannot catch more than small characins and cichlids. The migration is associated with spawning, and nearly all of the large species of fishes go up the rivers when the flood season begins. At this time the Indians go to the waterfalls to catch the masses of fish which are waiting for a rise of the river sufficient to enable them to get above the falls.

In swift water seines having a fine mesh are not good. For large fishes and fast-swimming species a longer seine with coarse meshes must be used. As a rule *Lepidosiren* can be captured during the dry season in swamps by cutting a circle in the grass and placing the seine in it. Then remove all of the grass and roll up the net.

2. *Gill-nets and Set-nets*.—Gill-nets can be used when there are no Piranhas (*Serrisalmoninæ*), but wherever Piranhas exist seining and netting have to be done skilfully and quickly, because the Piranhas can cut a net into pieces in an instant. Set-nets are very useful in rocky places, especially for mailed catfishes, which hide under rocks during the day.

3. *Dip-nets*.—In mountain rills, in grassy places, and under rocks in rapidly flowing water a dip-net is often needed, and with the aid of the feet many small mailed catfishes, *Pygidiida*, and small characins

can be driven into it. Small specimens buried in the sand may also be taken in a dip-net.

4. *Tarafa, or Casting-net.*—A tarafa or casting-net is very useful, especially at night and in muddy water. These conical nets can be thrown into the pot-holes of waterfalls, where no other kind of net can be used. They also can be cast between logs, in rapids, in muddy and grassy places, and do not necessarily require the entrance of the operator into the water, which is frequently dangerous. A small fine-meshed casting-net is needed for small species, while a net with large coarse meshes is necessary for large fishes.

5. *Diverting Stream into Net.*—In some of the mountain rills a net having a fine mesh can be put into the stream and then a portion of the stream above the net may be deflected into another channel. Everything may thus be taken. This is an especially good method of collecting *Pygidiidæ*.

6. *Rod and Line, Throwing Lines.*—A rod and line are good for small fishes, but wire leaders are needed, because several species are capable of cutting other kinds of leaders. For large catfishes, like *Jahu* and *Pirahyba*, a strong throwing line with a large hook is required. It is safer to tie the line to something, especially when fishing from the rocky ledges of waterfalls, where during the dry season one may easily hook a fish which one person cannot handle unaided.

7. *Trot- or Set-lines.*—Catfishes may readily be taken upon properly baited set-lines, but Piranhas and Candirus soon devour the fishes after they have been hooked. The destruction of specimens caused by these carnivorous fishes is not so great in extremely deep as in shallow water.

8. *Fish-traps.*—Fish-traps are useful along the banks of rivers and in deep water. Traps of different sizes and shapes may easily be made from vines and bamboos. Different kinds of bait must be used for different kinds of fishes. Below rapids and falls the Indians put in bamboo platforms when the streams are beginning to fall, and the fish pile up on them when they start over the falls. Along the lower Amazon where tidal effects are great, the natives put in long plaited wings leading up to a central pen which has an easily flexible entrance like any fish-trap, but no exit. When the tide falls the fish are left high and dry.

9. *Snares.*—Snares made of wire, thread, and fiber of bark can be used successfully for species which will not take a hook, and are hard to catch in a seine.



10. *Harpoons*.—The harpoon is useful in taking very large fishes, and it is nearly impossible to obtain very large specimens of the Pirarucu (*Arapaima gigas*) except by resorting to this method.

11. *Bow and Arrows*.—In places access to which is difficult because of brushwood, and plants, or because of rocks and rapids, or because of the swampy character of the banks, an Indian with his bow and arrows is sure to secure some prized specimens.

12. *Dynamite*.—In muddy places and deep water dynamite is not good, because so many fishes do not float when killed in this way. If the fish are feeding in water not too deep, over a solid bottom, and in brushy places, a charge of dynamite with a short fuse will kill most of the scaled species, but it is very hard to get the stunned catfishes. In deeper places I usually attach a float to the charge of dynamite. The carnivorous fishes will soon devour the stunned specimens, if they are not immediately gathered. Fishes killed with dynamite are always hard to preserve, for decomposition sets in much more rapidly than in the case of fishes taken in other ways, and the finer tissues and minuter organs are often filled with lesions destroying the usefulness of specimens for purposes of exact histological investigation.

13. *Native Poisons*.—There are several kinds of poisonous plants, the leaves, fruit, and bark of which will kill fish, but such poison is only good in lagoons and small streams which do not flow rapidly. *Timbo* is the best. It can be eaten by man, but when pounded and placed in a small lagoon it appears to interfere with the respiration of the fishes either by taking up the free oxygen in solution in the water, or by the prevention of the passage of oxygen through the gill membranes into the blood. As a rule the water turns black and it takes about ten hours to kill all of the fish, and even then *Hoplias* and *Erythrinus* are seldom killed, because they bury themselves in the mud, and the poison does not appear to affect them there.

14. *Processo da Mandioca*.—The mandioca process excels all others as a display of native ingenuity. A flexible pole is passed through a large mandioca root and is then secured in the sand or earth near a whirlpool or rapid. The upper end of the pole has a short string furnished with a hook which is pulled down and imbedded in the tip of the mandioca. When a fish like *Prochilodus* sucks and gnaws away the peeled tip of the mandioca, and liberates the hook,

the bent pole straightens out, flips up, and often catches the fish under its head.

15. *Angle-worms and Open Umbrella for Eels.*—The natives of Aregua, Paraguay, catch *Symbranchus* with a bunch of worms tied to a string and an opened umbrella. When the eels seize the worms they are jerked up with the upturned umbrella before they let go of the food.

16. *Dead Animals and Imprisoned Fishes.*—A freshly killed animal or an imprisoned large fish left in the rivers over night are sometimes full of *Cetopsis* and parasitic *Pygidiidæ* on the following morning.

17. *Hollow Logs and Submerged Canoes.*—Hollow logs and sunken canoes frequently yield prized specimens, if quietly and quickly removed from the water. In the case of such logs it sometimes is possible to stop or plug the open end and then roll them out upon the bank.

18. *Holes in Banks, Rocks, Stumps, and in Logs.*—Rare specimens were often taken by me in holes and crannies by the use of my naked hands.

19. *Soft-wood Canoes.*—I was told that the native caught a species of *Tachysurus* during the spawning season with soft-wood canoes. They are split and sunk quickly by means of weights. The erected dorsal spines of the mass of assembled fishes penetrate the soft wood and the fishes are held captives. This is possible from what I know of this fish, but I did not see this mode of fishing practiced.

#### PRESERVING AND TRANSPORTING SPECIMENS.

It is quite as difficult to save as to make collections while traveling in Brazil. In the remoter districts formalin is the best preservative on account of its small bulk. All medium-sized to large specimens should be injected the same day on which they are taken with 95 per cent. alcohol or a little strong formalin. The native rum or *cachaca* suffices to preserve specimens for only a few days. If kept longer in this fluid they soften. In tropical climates it is best to kill fishes by the use of strong alcohol, avoiding, however, a degree of strength sufficient to cause distortion after death. As a rule 70 per cent. alcohol is best, but there is no absolutely fixed formula for different species. It is almost impossible to transport fishes on mule-back and in ox-carts, because they are shaken to pieces sooner or later.

## THE ELEMENTS OF PERSONAL RISK IN COLLECTING IN THE TROPICS.

Fishing in South America is by far the most dangerous of all forms of scientific exploration. In addition to the dangers besetting the collector on land the fisherman is in danger of drowning, stepping on a sting-ray, getting into contact with an electric eel, getting bitten by Piranhas, *Palometes*, and *Candirus*, or being carried off by either a large anaconda, or caiman. Besides all of these dangers one has to pass his time in regions which are, as a rule, infested with all kinds of biting gnats, mosquitoes, flies, ants, and ticks. One must paddle about in rivers the margins of which are always laden with all kinds of tropical diseases.

In order to maintain good health in the tropics my advice would be to eat anything you can get, whenever you can get it, and as much as you crave, especially fruits, vegetables, and lean meat, avoiding fats. Keep hard at work. Eternal vigilance is the price of a good collection. Always sleep under a mosquito-bar, and go to bed early, thereby getting a good rest and taking few chances of being bitten by mosquitoes. Black coffee is a much better beverage than alcoholic drinks. I learned to smoke and think I was the better for it, because tobacco soothes the mind and drives away many of the annoying insects. I advise against taking quinine daily, but rather recommend the injection of liquid quinine when the fever comes. I took frequent baths and did not shave. Wounds heal up more quickly in the tropics than in temperate regions if the sunlight has access to them. It is best to keep the stomach slightly acid and a calomel purge should be used as soon as there are any signs of indigestion. If the stomach can be kept normal there is no danger of sickness. It is not absolutely necessary to boil or filter drinking water. I am thoroughly convinced that the temperament of the individual has a great deal to do with health in the tropics. Ever-changing activities and a variety of interests tend to produce a frame of mind which is hostile to disease. Calmness in the face of grave danger is indispensable. Worry and fretfulness should be banished. Great faith should be put in one's own arms, legs, and head. I am well aware that few are able to endure the hardships encountered in long journeys away from the beaten path in any climate, but my only trouble at any time while traveling in Brazil arose from the occasional difficulty of getting something to eat. I feel sure that most of the deaths of travelers in the tropics result either from inexcusable ignorance or from unnecessary fear.

## LOCALITIES FOR FUTURE WORK.

The Plano Alto, or central plateau of Brazil, supports an extremely meager fauna and flora. An occasional deer, beetles, and a few woodpeckers are the animals most commonly seen. But along the base of this dissected plateau are numerous large forests and jungles which are teeming with life and are as a rule free from the dreaded tropical diseases. The regions along the border of Bahia and Goyaz, between the Rio Grande and Rio Preto, teem with insects, birds, plants, and large mammals, especially during the dry season (April to November). This region is on the outskirts of civilization, and therefore a good place for collecting. Besides this area is quite accessible, another point to be considered by the collector. It is possible to go by rail from Bahia to Joazeiro and then by small steamers up the Rio São Francisco and Rio Grande to Barreiras, and also from Rio Grande up the Rio Preto to its junction with the Rio Sapon. In the eastern part of the São Francisco basin west of the Serra de Jacobina in the Rio Salitre valley, during extremely prolonged droughts, the denizens of forest and field are pushed out of their usual abodes to seek water. They consequently congregate around the salty lagoons of the Salitre basin. I have seen at one time more than one hundred species of birds, together with many of the larger mammals, more or less peacefully partaking of the scanty saline water.

The country of the Rio Ribeira da Iguape is the cheapest region of Brazil for an explorer, and it is quite accessible and has a good climate except during the heavy rains, which usually fall between December and April. From this part of Brazil one may easily get to Paraguay either by land or by water. The climate of eastern Paraguay is superb. Living in Paraguay is cheaper than elsewhere in South America. If the collector settles down in the interior and wins the confidence of the Indian children, great quantities of natural history specimens may be obtained by offering to them small sums.

The headwaters of the Rio Paraguay can be easily reached by steamer from the capital of Paraguay. The chapada of Matto Grosso and the Bolivian highlands draining into the Paraguay river are accessible, healthful, and a very rich field for natural history specimens.

With some difficulty the explorer can cross over into either the Guaporé or the Araguay basin. In the great Guaporé valley there is scarcely a break in the gigantic forests, which are choked by vines,

smothered by epiphytes, and filled in between by bamboos and scrubby plants. In the midst of this floral confusion roams the whistling tapir, howling, babbling, and squealing monkeys from the size of a mouse to that of a dog. Countless gorgeously colored birds and butterflies flit around, huge alligators bellow in the lagoons, and the fish never stop leaping after foolish insects. After the noises of the day the hush which comes at night-fall causes even the hardened traveler at times to shudder. No man over fifty years of age should attempt to enter this region. A hard heart and cold blood are useful to him who invades it.

### THE LOCALITIES AT WHICH MR. JOHN D. HASEMAN MADE COLLECTIONS.

BY C. H. EIGENMANN.

The following list of localities has been compiled from Mr. Haseman's notes, his manuscript map, and from the labels of the specimens so far examined. The localities are given in the order in which they were reached. Where a locality was visited more than once, it usually occurs only in the place given it by the first visit. With this list and the foregoing general account by Mr. Haseman students ought to have no difficulty in placing the localities. In some instances the dates in Mr. Haseman's notes do not agree with the dates on the labels accompanying the specimens. Since, however, the dates are always within a few days of each other, no great confusion can arise.

The collector's numbers attached to specimens are given in many cases.

The localities are numbered *seriatim*, and at the close of the paper is given an alphabetical list with reference to these numbers.

1. Rio Coite, into the Rio Salitre, into Rio São Francisco.  
Coll. Nos. 2, 14, 19. Nov. 6, 1907.
2. Rio Aqua Branca, into headwaters of Itapicurú.  
Coll. Nos. 40 and 41. Swift rocky stream from Serra de Jacobina. Nov. 6, 1907.
3. Rio Ipema, into headwaters of Itapicurú.  
Coll. No. 39. Small stream from Serra de Jacobina.  
Nov. 7, 1907.
4. Rio Lamas, small creek into headwaters of Itapicurú.  
Coll. No. 5. Nov. 7, 1907.

5. Rio Zinga, small creek into headwaters of Itapicurú.  
Coll. Nos. 6, 25 to 29. Nov. 7, 1907.
6. Rio Itapicurú Grande, headwater of Rio Itapicurú.  
Coll. No. 38. Swift and rocky mountain stream near Jacobina. Nov. 8, 1907.
7. Rio Pajaia, into headwaters of Itapicurú.  
Coll. Nos. 20-24. Small, rocky, rapid stream from Serra Jacobina between Bom Fim and Jacobina. Nov. 8, 1907.
8. Rio de Jacobina, into Rio Itapicurú.  
Coll. Nos. 33-37. Quiet, muddy stream, with plant-grown, swampy margins, some boulders; within sight of the mountains. Nov. 8, 1907.
9. Lagoa Salgado, Rio Salitre, into Rio São Francisco.  
Coll. Nos. 30-32. Saline lake with muddy margin in upper course of Rio Salitre. Nov. 10, 1907.
10. Bom Fim, Rio Amaratú, into Rio Itapicurú. Nov. 11, 1907.
11. Saõ Thome, Rio Salitre, into Rio São Francisco.  
Coll. Nos. 3, 4. Nov. 12, 1907.
12. Rio Salitre, into Rio São Francisco.  
Coll. Nos. 9, 10, 12, 13. Ten miles south of Baixa Grande in a stagnant water hole. Nov. 14, 1907.
13. Baixa Grande, Rio Paqui, into Rio Salitre, into Rio São Francisco.  
Coll. No. 1. Nov. 14, 1907.
14. Rio Paqui, into Salitre near Baixa Grande.  
Coll. Nos. 7, 8, 11. Small creek in semi-arid region; muddy and grass-grown, with some pebbles. Nov. 14, 1907.
15. Finca Amaratú, Rio Itapicurú.  
Creek on farm emptying into Itapicurú Mirim. Nov. 21, 1907.
16. Joazeiro, Rio São Francisco.  
Coll. Nos. 185-208. Sandy island in front of Joazeiro. Nov. 27, 1907.  
Coll. Nos. 42-124. Temporary backwater lagoon, deep and muddy; six miles east of town. Nov. 28, 1907.  
Coll. Nos. 125-184. Two miles below Petrolina, opposite Joazeiro. Rocky, weedy shore of the Rio São Francisco.
17. Barra, Fork of Rio São Francisco and Rio Grande.  
Coll. Nos. 125-154 (duplicated). Muddy water and muddy banks. Dec. 6, 1907.

18. Januaria, Rio São Francisco.  
Coll. Nos. 249-273. On sandy shores of an island in front of town. Dec. 12, 1907.  
Coll. No. 399. Dec. 18, 1907.
19. Cachoeira de Pirapora, Rio São Francisco.  
Coll. Nos. 155-249. In the river at and below the fall, a creek which enters the fall, a lagoon one and one-half miles below the fall. Dec. 15, 1907.
20. Lagoa de João Pereira, Barra, Rio São Francisco.  
Coll. Nos. 274-360. One of a series of five lakes, at times connected with the Rio São Francisco, at times dry. Dec. 23, 1907.
21. Lagoa de Porto, near Barra, Rio São Francisco.  
Coll. Nos. 362-398. One of a series of five lakes. Dec. 24, 1907.
22. Lagoa Barreiras, Rio São Francisco.  
Coll. Nos. 400-440. A weed-grown, muddy pond, with swampy margins, near the village Barreiras. Jan. 4, 1908.
23. Boqueirão, Rio Grande of Rio São Francisco basin.  
No numbers. Rio Grande and swampy grass-grown ponds; water clear. Jan. 6-9, 1908.
24. Lagoa Parnagua or Paranagua, Paranahyba basin.  
Coll. Nos. 441-450. West side, in plant-grown, muddy, swampy, sandy, and pebbly shores. Jan. 16, 1908.
25. Santa Rita de Rio Preto, into Rio Grande, into Rio São Francisco.  
Coll. Nos. 451-484. In the Rio Preto and tributaries. Jan. 24, 1908.
26. Rio Preto, ten miles below fork of Rio Sapão. Jan. 27, 1908.
27. Cachoeira da Velha, Rio Novo, into Rio Somno, into Tocantins.  
No numbers. Above and below fall. Swift current, clear water, rocky or sandy; in places grass-grown. Feb. 4, 1908.
28. Stromé, Rio Somno. Headwaters.  
No numbers. Headwaters, creeks, swampy "brejos." Feb. 6, 1908.
29. Rio Sapão, into Rio Preto, into Rio São Francisco. Near Prazeres.  
No numbers. Feb. 11, 1908.
30. Rio Preto, into Rio Grande, into Rio São Francisco.  
Coll. No. 486. Formosa. Feb. 15, 1908.

- No numbers. From the river, from a grass-grown lagoon, and from along the margin of the river seven miles below Formosa.  
Feb. 15, 1908.
31. Barra, on Rio São Francisco.  
Coll. Nos. 484-485. Rio São Francisco. Feb. 23, 1908.  
Coll. Nos. 487-488. Rio São Francisco. Feb. 24, 1908.
32. Queimadas, Rio Itapicurú.  
Coll. Nos. 489-494. In rapids of Rio Itapicurú.  
March 2, 1908.  
Coll. Nos. 495-532. Under railroad bridge. March 2, 1908.
33. Alagoinhas, Rio Catu.  
Coll. Nos. 538-550. Small, narrow stream, sticks, stones, grass-grown. March 4, 1908.
34. Rio Itapicurú.  
Coll. Nos. 532-537. Twelve miles from Timbo.  
March 5, 1908.
35. Bahia.  
Coll. Nos. 557-640. Various places about Bahia.  
March 11, 1908.  
Coll. Nos. 866-929. Bay of San Salvador. April 13, 1908.
36. Penedo, mouth of Rio São Francisco.  
Coll. Nos. 700-793. In and along Rio São Francisco. Both sides of river. March 22, 1908.  
Coll. Nos. 794-809. Clear pond one mile from river but connected with it at high water. March 22, 1908.  
Coll. Nos. 810-815. April 2, 1908.
37. Propria, Rio São Francisco.  
Coll. Nos. 816-824. Muddy places. March 30, 1908.
38. Maceio, on coast.  
Coll. Nos. 825-864. Various places in sea and fresh water.  
April 6, 1908.
39. Barra de Penedo, mouth of Rio São Francisco.  
Coll. Nos. 931-936. Mostly from clear pools used for drinking water.  
Coll. Nos. 937-938. Mouth of Rio São Francisco.  
April 7, 1908.
40. Aracaju, sea and brackish water.  
No Coll. Nos. April 10 1908.



41. Cachoeira, Rio Paraguassu.  
Coll. Nos. 939-972. River high, water rather dark, dirty.  
April 14, 1908.
42. Sete Lagoas, into Rio das Velhas, into Rio São Francisco.  
Coll. Nos. 973-976. In lake near town. May 4, 1908.  
Coll. Nos. 977-985. Creek, half mile south of town, rapid,  
rocky, cool. May 4, 1908.
43. Rio das Velhas, into Rio São Francisco.  
Coll. Nos. 986-988. Creek about three miles from town.  
May 10, 1908.  
Coll. Nos. 989-1004. Ponds about four miles from town.  
May 11, 1908.  
Coll. Nos. 1005-1036. In a mountain rill and small ponds.  
May 13, 1908.
44. Miguel Burnier.  
Coll. No. 1037. Headwaters of Rio das Velhas. Only 1  
species. May 14, 1908.  
Coll. Nos. 1038-1044. A rapid stream south of Miguel  
Burnier, tributary of Rio Paraopeba. Only two species.  
May 14, 1908.
45. São João del Rey, Rio das Mortes, into Rio Grande, into Parana.  
Coll. Nos. 1045-1073. Ponds, and rapid, mostly clear streams.  
May 19, 1908.  
Coll. Nos. 1074-1081. Seven miles from town in Rio das  
Mortes. May 19, 1908.
46. Sitio, Rio das Mortes, into Rio Grande, into the Parana.  
Coll. Nos. 1083-1088. Cool, clear, rapid stream, full of  
brush. May 21, 1908.
47. Serraria, Rio Parahybuna, into Rio Parahyba.  
Coll. No. 1082. Rapids of Rio Parahybuna. May 22, 1908.
48. Rio Doce.  
Coll. Nos. 1089-1109. In Rio Doce and creek near village of  
Rio Doce. May 24, 1908.  
Coll. Nos. 1110-1121. Rocky mill race at Rio Doce.  
May 25, 1908.  
Coll. Nos. 1122-1134. Creeks, pools and river. May 26, 1908.  
Coll. Nos. 1135-1136. Rio Doce. May 27, 1908.  
Coll. Nos. 1137-1158. Fumaca, whirlpool two miles below  
village of Rio Doce.  
Coll. No. 1159. Creek near town. May 28, 1908.

49. Entre Rios, Rio Parahyba.  
 Coll. Nos. 1160-1180. Shallow, grass-grown, cool, clear creek. June 1, 1908.  
 Coll. Nos. 1181-1201. Cool, clear, shallow creek two miles below town. June 2, 1908.  
 Coll. Nos. 1202-1203. Rio Parahyba. June 3, 1908.  
 Coll. Coll. Nos. 1204-1210. Rocky rapids. June 3, 1908.
50. Campos, Rio Parahyba.  
 Coll. Nos. 1265-1308. Two rather small lagoons one mile north of the Parahyba. Shallow, many grasses and aquatic plants. June 13, 14, 1908.  
 Coll. Nos. 1309-1310. Rio Parahyba. June 14, 1908.  
 Coll. Nos. 1311-1361. Sandy and muddy margins and lagoons two miles below Campos. June 15, 1908.  
 Coll. No. 1497. Lagoon near Campos along the Parahyba. June 26, 1908.
51. Lagoa Feia, near seacoast south of mouth of Parahyba.  
 Coll. Nos. 1362-1367. Shores, swampy, mucky with abundance of plants; 9 feet above sea level. June 16, 1908.  
 Coll. Nos. 1498-1499. Market at Campos. June 26, 1908.  
 Coll. Nos. 1500-1512. Tocos, swamp on sugar-farm. June 27, 1908.
52. Munez Freire or Cachoeira, Rio Itapemerim.  
 Coll. Nos. 1367-1399. Rio Itapemerim, sandy or rocky, clear and swift, and creek one mile below town. June 18, 1908.  
 Coll. Nos. 1400-1422. A plant-grown swamp through which passes a mountain stream. Cold water. Bed with logs, brush, and much mud. June 19, 1908.
53. São Joao da Barra, Parahyba.  
 Coll. Nos. 1423-1461. One mile below town and four miles from the sea, from river and lagoons.  
 Coll. Nos. 1462. In salt-water five miles below town. June 23, 1908.  
 Coll. Nos. 1463-1476. In fresh-water, also found in ocean. June 23, 1908.  
 Coll. Nos. 1477-1481. Mouth of Parahyba, along sand bar separating salt- and fresh-water. No fresh-water fishes. June 23, 1908.  
 Coll. Nos. 1482-1496. In running fresh-water along plant-grown margins of river. June 24, 1908.

54. Barra da Pirahy.  
Coll. No. 1513. Swampy rills. July 5, 1908.
55. Bom Jardim, Rio Grande, into Rio Paraná.  
Coll. Nos. 1514-1520. In lagoons above waterfall three miles above Bom Jardim. Cool, plant-grown, sand and mud. High altitude; few (6?) species. July 7, 1908.  
Coll. Nos. 1521-1523. Whirlpool below falls. July 8, 1908.
56. Santa Rita de Jacutinga, Rio Preto, into Parahyba.  
Coll. No. 1524. Lagoon above waterfalls near town. July 9, 1908.  
Coll. Nos. 1525-1528. Rio Preto below falls. Rocky and sandy; cool, rapid water. July 10, 1908.
57. Barra de Pirahy, Parahyba.  
Coll. Nos. 1529-1541. Rio Parahyba. July 12, 13, 1908.
58. Jacarehy, Rio Parahyba.  
Coll. No. 1542-1547. Creeks, ponds, swamps, one mile north of town. July 14, 1908.  
Coll. Nos. 1548-1561. Rio Parahyba and nearby lagoons. July 15, 1908.
59. Mogy das Cruzes, Rio Tieté, into Rio Paraná.  
Coll. Nos. 1562-1571. Rio Tieté, flat and swampy in places; sandy margins of river. July 17, 18, 1908.  
Coll. Nos. 1572-1590, Rio Tieté, one kilometer from town; clear, blackish, cool water. July 19, 1908.  
Coll. Nos. 1591-1592. Rio Tieté. July 20, 1908.
60. Piracicaba, Rio Tieté, into Rio Paraná.  
Coll. Nos. 1594-1598. July 23, 1908.  
See also No. 75.
61. Sapina, Rio Tieté, into Paraná.  
Coll. Nos. 1599-1616. Four miles from city. July 23, 1908.
62. Santos, coast of São Paulo. July 23, 1908.
63. Raiz de Serra, Rio Mogy, into Santos Bay.  
Coll. Nos. 1617-1632. Creek at base of mountains, ten miles from Santos. July 26, 1908.  
Coll. Nos. 1636-1654. Rio Mogy, clear, shallow, big granite boulders. July 27, 1908.
64. Alto da Serra, Rio Tieté, into Rio Paraná.  
Coll. Nos. 1633-1635. Small rills with an abundance of algae and reeds. July 25, 1908.

65. Piassaguera, near Santos.  
Coll. Nos. 1655-1656. In fresh water near a bay of ocean.  
July 29, 1908.
66. Santos.  
Coll. Nos. 1657-1685. Marine fishes. July 29, 1908.
67. Rio Pilao, near Santos.  
Coll. Nos. 1712-1713. From torrent 100 feet broad, one foot deep, fifteen miles southwest of Santos, near water-works.  
July 31, 1908.
68. Cubatão, Rio Cubatão.  
Coll. Nos. 1714-1729. Clear, swift, and rocky creeks, seven miles west of Santos. July 31, 1908.
69. Mogy Mirim, into Rio Mogy Guassu, into Rio Grande, into Rio Parana.  
No numbers. River, creeks, lagoons about Mogy Mirim.  
Aug. 7, 1908.
70. Corrego de João de Deus. Twelve miles from Mogy Mirim.  
No numbers. Aug. 7, 1908.
71. Rio Paranahyba, into Rio Paraná.  
No numbers. Bridge twenty-one miles above Araguay.  
Aug. 14, 1908.
72. Jaguará, Rio Grande, into Rio Paraná.  
Coll. Nos. 1740-1770. Creeks and lagoons of the Rio Grande.  
Aug. 18, 19, 1908.
73. Mogy Guassu, Rio Mogy Guassu, into Rio Grande, into Paraná.  
Coll. Nos. 1771-1787. River, creeks, etc., about Mogy Guassu.  
Aug. 25, 26, 1908.
74. Bebedouro, near Rio Grande, and Rio Paraná.  
Coll. Nos. 1788-1805. Creek and swampy ponds.  
Sept. 1, 1908.
75. Piracicaba, Rio Tieté, into Rio Paraná.  
Coll. Nos. 1812-1822. Below big falls of the Rio Piracicaba.  
Sept. 5, 8, 9, 1908.  
Coll. Nos. 1806-1810. Rio Piracicaba-Mirim, above big falls.  
Sept. 7, 1908.  
Coll. Nos. 1811. Below falls of Rio Piracicaba-Mirim, under stones. Above falls of Rio Piracicaba. Sept. 7, 1908.
76. Salto de Avanhadava, Rio Tieté.  
Coll. Nos. 1834-1853. In mill race—above the falls, rocky, clear.  
Sept. 14, 1908.

- Coll. Nos. 1854-1864. In and below the falls.  
Sept. 15-17, 1908.
77. Salto das Cruces, Rio Tieté.  
Coll. Nos. 2004-2008. Above falls.  
Coll. Nos. 2010-2015. Muddy hole near entrance of and above rapids. Sept. 22, 1908.  
No numbers. Twenty miles from Salto das Cruces at railroad camp.
78. Salto das Cruces, Rio Tieté.  
Coll. Nos. 2001-2002. Mud-hole along margin of river.  
Sept. 22, 1908.
79. Itapura, Rio Tieté.  
Coll. No. 2003. A canal around big falls. Sept. 27, 1908.
80. Miguel Calmon.  
No numbers. Twenty miles east of Avanhandava in lake and swampy creek. Oct. 11, 1908.
81. Bauhru, Rio Tieté. No numbers.
82. Salto Grande de Paranapanema, into Rio Parana.
83. Aqua Quente, into Rio Ribeira da Iguape.  
Coll. Nos. 2020-2046. Eight miles from Iporanga in small mountain creeks near caves. Nov. 27, 1908.
84. Cavernas das Areas.  
Coll. Nos. 2047-2060. Sixteen miles southwest of Iporanga in Serra do Mar. Nov. 28, 1908.
85. Iporanga, Rio Ribeira da Iguape.  
Coll. Nos. 2061-2092. In Rio Ribeira and tributaries.  
Dec. 1, 1908.
86. Xiririca, Rio Ribeira da Iguape.  
Coll. Nos. 2093-2100, 2125-2130. Dec. 5, 8, 1908.
87. Iguape, Rio Ribeira da Iguape.  
Coll. Nos. 2100-2124. From Ricardo Krone. Dec. 13, 1908.  
Coll. Nos. 2135-2140. Near sea, but in swampy, mucky, fresh-water. Dec. 15, 1908.  
Coll. Nos. 2141-2147. Small mountain rills back of city.  
Dec. 16, 1908.
88. Serrinha Paraná, Rio Iguassú, into Paraná.  
Coll. Nos. 2148-2156. Rio Iguassú. Dec. 22, 1908.  
Coll. Nos. 2157-2165. Creek near the river. Dec. 22, 1908.

89. Rio das Mortes, into Rio Iguassú.  
Coll. Nos. 2170-2176. Creek six miles west of Serrinha, with numerous falls.
90. Porto União da Victoria, Rio Iguassú.  
Coll. Nos. 2177-2196. High floods, in muddy places.  
Dec. 27, 1908.  
Coll. Nos. 2197-2203. Rio Iguassú and flooded margins, swamps and lagoons.  
Dec. 28, 1908.  
Coll. Nos. 2204-2210. Four miles below town. Dec. 29, 1908.
91. Morretes, on Marunby, into Rio Nhundiaquara, into ocean at Paranagua.  
Coll. Nos. 2212-2236. Rapids and swampy margins.  
Jan. 2, 3, 1909.  
Coll. Nos. 2237-2257. Rocky, rapid course of one of many creeks.  
Jan. 4, 1909.
92. Porto Alegre, Rio Grande do Sul.  
Coll. Nos. 2252-2263, 2276-2277, 2280-2297, 2321-2332. Rio Guahyba in front of town.  
Jan. 17, 18, 20, 21, 22, 24, 1909.
93. Cachoeira, Rio Jacuhy, into Lago dos Patos at Rio Grande do Sul.  
Coll. Nos. 2333-2352. Creeks of Rio Jacuhy near town.  
Jan. 26, 27, 1909.
94. Santa Maria, Rio Vaccacahy-Mirim, into Rio Guahyba, into Jacuhy.  
Coll. Nos. 2342-2345. Small, rocky, clear mountain-stream, two miles east of town; few fish.
95. Cacequy, Rio Ibicuhy, into Uruguay.  
Coll. Nos. 2346-2360. Creeks near railroad station.  
Jan. 31, 1909.  
Coll. Nos. 2361-2382. Eight kilometers west of town, Rio Ibicuhy.  
Feb. 1, 1909.  
Coll. Nos. 2383-2389. Rio Cacequy one mile from railroad station.  
Feb. 1, 1909.
96. Uruguayana, Rio Uruguay  
Coll. Nos. 2390-2453. Rio Uruguay, deep, muddy water.  
Feb. 5, 1909.
97. Rio Negro, Urúguay, or Paso de los Torros, into Rio Uruguay.  
No numbers.
98. Arroyo Miguelete, Montevideo.  
No numbers.  
Feb. 17, 1909.

99. San Juan, Argentina.  
Coll. Nos. 2500-2512. Rio San Juan and irrigating canals.  
Feb. 25, 27, 1909.
100. Rio Colorado, Argentina.  
Coll. Nos. 2529-2530. Choel-choel, tributary of Rio Negro.  
March 4, 1909.  
Coll. Nos. 2513-2528. Rio Colorado. March 5, 1909.  
Coll. Nos. 2531-2532. Muddy ponds twenty miles east of  
town of Colorado. March 6, 1909.
101. Buenos Aires, Rio de Prata.  
Coll. Nos. 2533-2536. March 11, 1909.
102. Asuncion, Paraguay.  
Coll. Nos. 2540-2542. Rio Paraguay. March 23, 1909.  
Coll. Nos. 2543-2544. Cerro de Lambaré, five miles below  
Asuncion in saline swamp.  
Coll. Nos. 2546-2553. Bays in front of and near Asuncion.  
March 30, 31, 1909.  
Coll. Nos. 2554-2556. Rio Paraguay.
103. Sapucay, Paraguay.  
Coll. Nos. 2557-2576. Mountain rills near town.  
April 2, 1909.  
Coll. Nos. 2577-2585. Arroyo Poná. April 5, 1909.
104. Arequa, Paraguay.  
Coll. Nos. 2586-2591. Laguna Ipacary. April 7, 8, 1909.
105. Villa Hays, mouth of Rio Confusso, into Rio Paraguay.  
Coll. No. 2593. April 11, 1909.  
Coll. Nos. 2594-2599. April 13, 14, 1909.
106. Corumba, on Rio Paraguay, Matto Grosso.  
Coll. Nos. 2650-2661. Lagoons and rivers near town.  
April 28, 1909.  
Coll. Nos. 2662-2666. Rio Paraguay. April 2(-), 1909.  
Coll. Nos. 2695-2702. Rio Paraguay. May 9, 1909.
107. Urucum Mountains, 25 miles back of Corumba, Matto Grosso.  
No numbers. April 27, May 2, 1909.
108. Puerto Suarez, 15 kilometers across bay from Corumba, Bolivia.  
Coll. Nos. 2667-2690. One mile from village. May 6, 1909.  
No numbers and 2691-2694. May 7, 1909.
109. São Luiz de Caceres, Matto Grosso.  
Coll. Nos. 2703-2708. Rio Paraguay. May 23, 1909.

- Coll. No. 2709. Creek six miles back of São Luiz.  
May 23, 1909.
- Coll. Nos. 2710-2730. Old cut-off of Rio Paraguay.  
May 24, 1909.
- Coll. Nos. 2731-2750. Rio Paraguay. May 20, 1909.
- Coll. Nos. 2751-2758. Rio Paraguay. May 27, 1909.
110. Campos Alegre, Rio Jauru, into Rio Paraguay.  
Coll. Nos. 2759-2770. Twenty-eight miles above mouth of  
Rio Jauru and about thirty southwest of São Luiz de Cáceres.  
Rich fauna. June 2, 1909.  
Coll. Nos. 2771-2773. June 3, 1909.
111. San Matias, Bolivia, into Rio Paraguay.  
No numbers. Lagoon near village. June, 1909.  
No numbers. Cave twelve miles from San Matias, on frontier  
of Brazil and Bolivia. June, 1909.  
No numbers. Carricha from the cave. June, 1909.
112. Rio São Francisco, into Rio Paraguay, Matto Grosso.  
Coll. Nos. 2771-2775. Sixteen miles west of San Matias.  
June 10, 1909.
113. Rio Santa Rita, into Rio Paraguay, Matto Grosso.  
Coll. Nos. 2776-2779. Near frontier of Bolivia. June 12, 1909.
114. Petas, Bolivia, into Rio Paraguay.  
Coll. No. 2780. June 13, 1909.
115. Rio Boa Ventura, into Rio Guaporé of Amazon basin.  
Coll. Nos. 2781-2786. South of Villa de Matto Grosso.  
June 16, 1909.
116. Posada, into Guaporé.  
Coll. No. 2787. About forty miles south of Villa de Matto  
Grosso. June 21, 27, 1909.
117. Bastos, Rio Alegre, into Rio Guaporé.  
Coll. Nos. 2788-2800. Eight miles south of Villa de Matto  
Grosso. June 26, 28, 1909.
118. Rio Guaporé.  
No numbers. Below mouth of Rio Paragan. July 8, 1909.  
No numbers. Sixty miles above San Antonio de Guaporé.  
July 23, 1909.  
Coll. Nos. 2833-2843. San Antonio de Guaporé.  
July 29, 1909



- Coll. Nos. 2844-2846. Swamp four miles from Rio Guaporé.  
July 30, 31, Aug. 3, 1909.
- Coll. Nos. 2847-2913. San Antonio de Guaporé in Rio  
Guaporé. Aug. 3, 9, 10, 11, 13, 1909.
119. Rio Machupo, Bolivia, into Rio Guaporé.  
Coll. Nos. 2922-2924. Twenty miles below San Joaquin.  
Aug. 28, 1909.
120. San Joaquin, Bolivia.  
Coll. Nos. 2925-2927. Rio Machupo.  
Coll. Nos. 2928-2945. Lake one mile west of town.  
Sept. 4, 1909.  
Coll. Nos. 2946-2980. Rio Machupo. Sept. 5, 6, 1909.  
Coll. No. 2981. Mud-hole near town. Sept. 7, 1909.
121. Berlin, Rio Mamoré.  
Coll. No. 2982. Rio Mamoré, three miles south of Berlin.  
Sept. 14, 1909.  
Coll. Nos. 2983-2989. Rio Mamoré. Sept. 15, 1909.
122. Rio Mamoré.  
Coll. Nos. 2990-2997. Below mouth of Rio Guaporé.  
Sept. 19, 1909.
123. Guaja-ussu, Rio Madeira.  
No numbers. Sept. 28, 1909.
124. Palo Grande, Mamoré.  
Coll. No. 2998. Waterfall in Mamoré, in rapids under stones.  
Sept. 30, 1909.
125. Villa Bella, Bolivia, Rio Beni, into Rio Madeira.  
Coll. Nos. 2999-3010. Rising river; hard to collect.  
Oct. 5, 1909.  
No numbers. Swamp back of Villa Bella.
126. Cachoele de Ribeirão, Rio Madeira.  
Coll. Nos. 3011-3012. Oct. 17, 1909.
127. Cachoele de Theotone, Rio Madeira.  
Coll. Nos. 3015-3020. In whirlpool. Oct. 13, 1909.
128. Cachoele de Girão, Rio Madeira.  
Coll. Nos. 3020-3025. Whirlpools. Oct. 26, 1909.
129. São Antonio de Rio Madeira.  
Coll. Nos. 3013-3014. Nov. 2, 1909.  
Coll. Nos. 3026-3035. Rio Madeira near São Antonio.  
Nov. 3, 1909.

130. Manaus, mouth of Rio Negro.  
 Coll. Nos. 3036-3155. About Manaus. Nov. 15-19, 25, 27-29, 1909.  
 Coll. Nos. 3156-3158. Igarapé de Cachoeira Grande, two miles out of Manaus. Nov. 30, 1909.  
 Coll. Nos. 3159-3166. Manaus. Dec. 2, 1909.  
 Coll. Nos. 3167-3168. Ten miles above Manaus on Rio Negro. Dec. 4, 1909.
131. Santarem.  
 Coll. Nos. 3169-3185. Rio Tapajos. Dec. 6, 1909.  
 Coll. Nos. 3816-3202. Swampy pools of Amazon and Tapajos opposite Santarem. Dec. 7, 1909.  
 Coll. Nos. 3203-3218. Rio Tapajos. Dec. 8, 1909.  
 Coll. Nos. 3219-3241. Upper end of island; Amazon, four miles above Santarem. Dec. 9, 1909.  
 Coll. No. 3242. Tapajos: in hollow logs in Amazon, one mile above Santarem. Dec. 10, 1909.  
 Coll. Nos. 3256-3271, 3307-3308. Igarapé de Jaura, entering Rio Tapajos, two miles above Santarem. Dec. 11, 19, 1909.  
 Coll. Nos. 3243-3355. Igarapé de Maíca, four miles below Santarem. Dec. 12, 1909.  
 Coll. No. 3272. Tapajos in front of Santarem. Dec. 14, 1909.  
 Coll. Nos. 3273-3306. Island in Amazon, three miles above Santarem. Dec. 15, 1909.  
 Coll. Nos. 3324-3325. Rio Tapajos at Santarem. Dec. 20, 1909.
132. Amazon.  
 Coll. Nos. 3309-3310. Half-way between Santarem and Para. Dec. 21, 1909.  
 Coll. Nos. 3311-3323. Para market. Dec. 24, 1909.  
 Coll. Nos. 3326-3351. From Gran Para, between Belem and Salinas. Dec. 27, 1909.  
 Coll. Nos. 3402-3403. Jan. 4, 1910.  
 Coll. Nos. 3412-3443, 3451-3499. Market. Jan. 15-22, 1910.
133. Bragança, Rio Caete, 16 kilometers from ocean, 162 from Para.  
 Coll. Nos. 3352-3365. Igarapé in Bragança. Dec. 29, 1909.  
 Coll. Nos. 3366-3400. Salt water, mouth of Rio Caete. Jan. 1, 1910.

134. Alcobaca, Tocantins.

Coll. Nos. 3344-3450. Below first falls.

Jan. 10, 1910.

## ALPHABETICAL LIST OF LOCALITIES.

- |                           |                                 |
|---------------------------|---------------------------------|
| Alagoinhas, 33            | Cavernas das Areas, 84          |
| Alcobaca, 134             | Coite, Rio, 1                   |
| Alto da Serra, 64         | Colorado, Rio, 100              |
| Amaratú, Rio, 10          | Corregade Joãos de Deus, 70     |
| Amazon, 132               | Corumba, 106                    |
| Aqua Branca, Rio, 2       | Cubatão, 68                     |
| Aqua Quente, 83           | Doce, Rio, 48                   |
| Aracaju, 40               | Entre Rios, 49                  |
| Arequa, 104               | Finca Amaratu, 15               |
| Arroyo Miguelete, 98      | Guaja-ussu, 123                 |
| Asuncion, 102             | Guaporé, 118                    |
| Bahia, 35                 | Iguapé, 87                      |
| Baixa Grande, 13          | Ipema, Rio, 3                   |
| Barra, 17, 31             | Iporanga, 85                    |
| Barra, São João da, 53    | Itapicurú, Rio, 6, 34           |
| Barra de Penedo, 39       | Itapura, 79                     |
| Barra da Pirahy, 54, 57   | Jacarehy, 58                    |
| Bastos, 117               | Jacobina, Rio de, 8             |
| Bauhru, 81                | Jaguara, 72                     |
| Bebedouro, 74             | Januária, 18                    |
| Berlin, 121               | João, S. del Rey, 45            |
| Bom Fim, 10               | Joaquim, San, 120               |
| Bom Jardim, 55            | Joazeiro, 16                    |
| Boqueirão, 23             | Lagoa de João Pereira, 20       |
| Bragança, 133             | Lagoa Barreiras, 22             |
| Buenos Aires, 101         | Lagoa Feia, 51                  |
| Cacequy, 95               | Lagoa Parnagua or Paranagua, 24 |
| Cachoeira, 41, 93         | Lagoa de Porto, 21              |
| Cachoeira de Piropora, 19 | Lagoa Salgado, 9                |
| Cachoeira da Velha, 27    | Lamaras, Rio, 4                 |
| Cachoele de Girão, 128    | Luiç, São, de Caceres, 109      |
| Cachoele de Ribeirão, 126 | Maceio, 38                      |
| Cachoele de Theotone, 127 | Machupo, Rio, 119               |
| Campos, 50                | Mamoré, Rio, 122                |
| Campos Alegre, 110        | Manaos, 130                     |

- Maria, Santa, 94  
 Matias, São, 111  
 Miguel Burnier, 44  
 Miguel Calmon, 80  
 Mogy das Cruzes, 59  
 Mogy Guassú, 73  
 Mogy Mirim, 69  
 Morretes, 91  
 Mortes, Rio das, 89  
 Munez Freire da Cachoeira, 52  
 Negro, Rio, 97  
 Paiaia, Rio, 7  
 Palo Grande, 124  
 Paqui, Rio, 14  
 Paranahyba, Rio, 71  
 Penedo, 36  
 Petas, 114  
 Piassaguera, 65  
 Pilão, Rio, 67  
 Piracicaba, 60, 75  
 Porto Alegre, 92  
 Porto União da Victoria, 90  
 Posada, 116  
 Preto, Rio, 26, 30  
 Propria, 37  
 Puerto Suarez, 108  
 Queimadas, 32  
 Raiz da Serra, 63  
 Salitre, Rio, 12  
 Salto de Avanhandava, 76  
 Salto das Cruzes, 77  
 Salto Grande de Paranapanema, 82  
 Santa Rita, Rio, 113  
 Santa Rita de Jacutinga, 65  
 Santa Rita de Rio Preto, 25  
 San Juan, 99  
 Santarem, 131  
 Santos, 62, 66  
 São Antonio de Rio Madeira, 129  
 São Francisco, Rio, 112  
 São João da Barra, 53  
 São João del Rey, 45  
 São Luiz de Caceres, 109  
 São Thome, 11  
 Sapão, Rio, 29  
 Sapina, 61  
 Sapucay, 103  
 Serraria, 47  
 Serrinha Paraná, 83  
 Sete Lagoas, 42  
 Sitio, 46  
 Stromé, 28  
 Thome, São, 11  
 Tocantins, 135  
 Urucum Mountains, 107  
 Uruguayana, 96  
 Velhas, Rio das, 43  
 Ventura, Rio Bõa, 115  
 Villa Bella, 125  
 Villa Hayes, 105  
 Xiririca, 86  
 Zinga, Rio, 5